

REMARKS

I. Status of the Application

Claims 19-53 are presently pending in the application. Claims 37-53 are allowed. New claims 54-70 mirror allowed claims 37-53 except for the limitation regarding 360 degree rotation. Since claims 54-70 do not require the 360 degree limitation to distinguish over the cited art, claims 54-70 are believed to be patentable. Claim 34 stands rejected under 35 USC § 112, second paragraph, on the grounds that the phrase “and the like” is indefinite. Claims 19, 23-26, 30-36 stand rejected under 35 USC § 103(a) as being obvious over U.S. Patent No. 4,984,959 to Kato in view of U.S. Patent No. 5,982,127 to Matsubara et al. Claims 20, 27 and 28 stand rejected under 35 USC § 103(a) as being obvious over Kato in view of Matsubara and U.S. Patent No. 5,661,387 to Stadele et al. Claims 21-22, 29 and 37-53 are indicated as being allowable if rewritten to overcome the rejection(s) under 35 USC § 112, second paragraph, and to include all of the limitations of the base claim and any intervening claims. Applicant assumes that the indication that claims 37-53 are allowable is a typographical error, since the cover sheet indicates that claims 37-53 are allowed, and the Office Action at page 9 indicates that the prior art does not show or suggest the subject matter of claim 37, which is an independent claim from which claims 38-53 depend and which has not been rejected under 35 USC § 112.

The drawings are objected to under 37 CFR §§ 1.83(a), 1.84(p)(4) on the grounds that axis L1 and end plate 152 are not shown, and that reference character “206” is used to designate both bearings and tension rods. The specification has been objected to on the grounds that deleted claims are referenced throughout the disclosure.

Claim 34 has been amended to delete the phrase "and the like." Accordingly, Applicant respectfully requests that the rejection of claim 34 under 35 USC § 112, second paragraph, be withdrawn. ✓

Applicant has amended the specification at page 7, line 28 to correct a typographical error relating to the longitudinal axis of foot part 2. Specifically, the longitudinal axis has been amended to correctly read "L," as is shown in the Figures and referenced elsewhere in the specification. Figure 5 has been amended to show end plate 52. Figure 7C and the specification at page 16, line 8, have been amended to show the bearings as element "205" rather than "206." Copies of amended Figs. 5 and 7C, which have been submitted to the Official Draftsperson, with the proposed changes being shown in red, are enclosed for the Examiner's convenience. ✓
Accordingly, applicant requests that the objections to the drawings under 37 CFR §§ 1.83(a), 1.84(p)(4) be withdrawn.

The specification has also been amended in various locations to remove the references to deleted claims, and at page 16, line 9, to correct a typographical error, and is now believed to be in proper form. ✓ Attached hereto is a marked up version of the changes made to the specification and claims entitled "Version with Markings to Show Changes Made."

The foregoing amendments in view of the following remarks are believed to place all pending claims of this application in condition for allowance. Accordingly, reconsideration of the application and allowance of claims 19-53 as now submitted is respectfully requested.

II. Claims 19, 23-26, and 30-36 Are Nonobvious Over Kato and Matsubara

Claims 19, 23-26, 30-36 stand rejected under 35 USC § 103(a) as being obvious over U.S. Patent No. 4,984,959 to Kato in view of U.S. Patent No. 5,982,127 to Matsubara et al. This rejection is respectfully traversed.

Kato discloses a robotic arm having a body 1, a trunk 2, a shoulder 31a, an upper arm 31e, a forearm 51e connected to upper arm 31e by an elbow, and a wrist 51c holding a hand device 7. Motors (16a, 14a, etc.) are housed in body 1.

Matsubara discloses a robot 1 having a vertically movable mount structure 2. A pair of springs 6 are connected in series and secured at one end to a bottom of robot 1 and at their other end to a bracket 9, which moves with mount structure 2. A first operating arm 10 is rotatably supported by mount structure 2. A second operating arm 14 is rotatably supported at one end by first operating arm 10. A rotation shaft 16 is mounted on the other end of second operating arm 14.

Neither Kato nor Matsubara, alone or in combination, discloses or makes obvious a manipulator comprising a foot part and a number of members, with a second member rotatable about an elbow axis relative to a first member, wherein compensating means is provided in the footpart **for the first member and the second member** which, upon movement of the members, at least partially compensate for the moment exerted by the first member relative to the foot part **and by the second member** relative to the elbow axis, as required by independent claim 19.

As noted by the Examiner, Kato does not disclose a compensating means. The compensating means of Matsubara comprises a pair of springs 6 in series that are connected at one end to a bottom of the robot and at their other end to a bracket 9, which moves with mount structure 2. The sole function of these springs is to balance the weight of mount structure 2 during vertical movement thereof (see, e.g., col. 1, lines 11-13, and 51-59; col. 2, lines 33-37, and 55-63; col. 3, lines 47-48; and col. 3, line 67 through col. 4, line 20). Thus, this compensating means can compensate only for the moment of a first member, namely, mount structure 2. This compensating means does not compensate for a second member, as required by

independent claim 19. Specifically, springs 6 have no effect at all on any of the other members of robot 1, namely first operating arm 10, second operating arm 14, or rotation shaft 16. Consequently, the claimed compensating means is not disclosed or made obvious by Matsubara and the rejection should be withdrawn. Claims 23-26, and 30-36, which depend from claim 19, are believed to be allowable as well.

III. Claims 20, 27, and 28 Are Nonobvious Over Kato, Matsubara, and Stadele

Claims 20, 27, and 28 stand rejected under 35 USC § 103(a) as being obvious over Kato in view of Matsubara and U.S. Patent No. 5,661,387 to Stadele et al. This rejection is respectfully traversed.

Stadele fails to overcome the deficiencies of Kato and Matsubara noted above. Specifically, Stadele fails to disclose or make obvious compensating means provided in a footpart for a first member **and second member** which, upon movement of the members, at least partially compensate for the moment exerted by the first member relative to the foot part **and by the second member** relative to an elbow axis, as required by independent claim 19, from which claims 20, 27 and 28 depend. Stadele simply has no compensating means. Accordingly, the rejection is improper and should be withdrawn.

IV. Claims 21-22, 29, 37-53 Are Allowable in Their Present Form

Applicant thanks the Examiner for the indication that claims 21-22, 29 and 37-53 would be allowable if rewritten to overcome the rejection(s) under 35 USC § 112, second paragraph, and to include all of the limitations of the base claim and any intervening claims.

As noted above, claims 37-53 are believed to be allowed by the present Office Action. Since claim 19 is believed to be allowable, as discussed above, and all § 112 rejection(s) are

believed to be fully addressed, claims 21-22, and 29, which depend from independent claim 19, are believed to be allowable in their present form.

In view of the foregoing amendments and remarks, pending claims 19-70 are believed to be allowable, and an indication to that effect from the Examiner is respectfully requested at this time. If a telephone conversation with applicant's attorney would expedite prosecution of the above-referenced application, the Examiner is urged to call the undersigned at the number below.

Please apply any required charges or credits to our Deposit Account No. 19-0733.

Date:

January 2, 2003

Respectfully submitted,



John P. Iwanicki, Reg. No. 34,628
BANNER & WITCOFF, LTD.
28 State Street, 28th Floor
Boston, MA 02109
Telephone: (617) 227-7111

Version With Markings to Show Changes Made

In the Specification:

The paragraph beginning at page 7, line 11 has been rewritten as follows:

In this specification, identical or corresponding parts have identical or corresponding reference numerals. In this specification, a manipulator 1 is shown having a foot part 2, a first member 4, a second member 6, a third member 8 and a gripper 10. The gripper 10 is designed with, for instance, two or three fingers 12A, 12B that can be moved towards each other, but, if so desired, it may also be designed differently, for instance with snap means specifically adjusted to an object to be picked up or engaged otherwise, magnetic means, more or fewer fingers, and the like. In this specification, the first member 4 will be referred to as upper arm, the second member 6 will be referred to as lower arm and the third member 8 will be referred to as wrist. The foot part 2 is of substantially tubular design, as will be explained in more detail hereinbelow, and is connected, via a foot plate as shown in more detail in Fig. 10, to a base plate 14 for rotation about its longitudinal axis L[1], which base plate 14 can be directly connected to the fixed world or, for instance, to a constructional part 18 via a parallel arm construction 16, as shown in Fig. 1, to enable the manipulator 1 to be moved in vertical direction V. Of course, other types of suspension constructions can be used, enabling translating and/or rotating movements of the entire manipulator 1 in the desired directions.

The paragraph beginning at page 15, line 21 has been rewritten as follows:

The pack of second shafts 170 comprises a seventh rotary shaft 174 provided with a seventh driving geared belt wheel 176 adjacent a first end thereof and fixedly connected, via an end plate 178, to the lower arm section 180 adjacent its opposite end. Hence, rotation of the

seventh rotary shaft 174 involves a rotation of the lower arm 6 relative to the upper arm 4 around the elbow axis E. The shafts of the pack of second drive shafts 170 are again hollow and thin-walled and concentrically positioned relative to each other. An eighth rotary shaft 182 is provided with an eighth driving geared belt wheel 184 adjacent its first end and with a frustoconical eighth driven gear 186 adjacent its opposite end. The ninth rotary shaft 188 is provided with a ninth driving geared belt wheel 190 adjacent its first end and with a frustoconical ninth driven geared belt wheel 192 at its opposite end, the tenth rotary shaft 194 is provided with a tenth driving geared belt wheel 196 adjacent its first end and with a frustoconical tenth driven gear 198 adjacent its second end. The inner eleventh rotary shaft 200 is provided with an eleventh driving geared belt wheel 202 adjacent its first end and with a frustoconical driven eleventh gear 204 adjacent its opposite second end. The frustoconical gears 186, 192, 198 and 204 are substantially fitted one within the other, with the interposition of suitable bearings [206] 205, for instance ball bearings, such that these gears form a frustoconical body.

In the Claims:

Claim 34 has been amended as follows:

34. (Amended) A manipulator according to claim 19, wherein spaces are provided in the foot part for accommodating spring means for compensating means[,] and electronic components [and the like].